Even if the Lai application issues as a U.S. patent, all pending claims of the present invention are quite distinguishable therefrom for multiple reasons already articulated in the July 5, 2000 Amendment with respect to earlier cited prior art. The Lai Application teaches the use of a high-powered (i.e., 150 mJ/cm2) fundamentally **infrared** laser, not a low powered fundamentally **ultraviolet** laser as recited by all Reissue claims of the present application. While Lai teaches the use of **non-overlapping** ablation pulses, all claims of the present invention claim a **significant overlap** of ablation pulses.

Particular details of the Patented claims 1-23 and the pending Reissue claims are discussed herein in more detail with respect to the Lai U.S. Application (as presumed to correspond to the subject matter disclosed in the A1 publication of PCT/US92/09625.

*Delivery of an ablating laser beam in a predetermined **overlapping pattern***

All pending claims recite scanning a laser beam in either a **significant** or **predetermined overlapping pattern** of ablation pulses.

In contrast, the Lai Application teaches that there are problems associated with overlapping the laser pulses of any one layer, and concludes that these problems are solved with his invention by not overlapping the laser pulses of any one layer. (Lai PCT Publication, page 47, lines 28-29)

As further evidence, Lai's Fig. 7A shows a preferred ablation pattern whereby ablation pulses in any layer are not overlapped. "A characteristic of the first level pattern shown in Figure 7A is that no circular etch substantially overlaps any other circular etch." (Lai PCT Publication, page 49, lines 28-29) Lai indicates that "[w]hile it is preferred that the etch circles be non-overlapping and contiguous, [Lai's] invention encompasses slight overlapping and/or spacing of etch circles due to tolerance". (Lai PCT Publication, page 48, lines 22-25)

Clearly Lai teaches *away from* any **significant** or **predetermined overlapping** of ablation pulses as claimed by all pending claims.

*Fundamentally **ultraviolet** laser*

All Reissue claims of the present invention recite a fundamentally **ultraviolet** laser. The Lai Application teaches a fundamentally **infrared** laser, thus teaching *away from* the use of a fundamentally **ultraviolet** laser.

For instance, the Lai application teaches that "problems . . . occur with some of the prior art systems result[ing] from the use of toxic gases as the lasing material." The Lai application continues to teach *away from* the use of excimer ultraviolet lasers by indicating that there are particular *problems* with "excimer lasers, which are frequently used in health clinic and hospital environments." (Lai PCT Publication, page 6, lines 9-12). In fact, the Lai application goes on to declare that it "resolves the shortcomings of the current corneal surgical systems, including the use of toxic gases" (i.e., ultraviolet excimer lasers). (See Lai PCT Publication, page 7, lines 15-21)

The Lai application identifies **infrared** laser source embodiments, including a Ti-doped Al_2O_3 solid state laser converted to an ultraviolet range of 198-215 nm. (See Lai PCT Publication, page 13, lines 3-11; page 33, lines 27-29) The Lai application explicitly refers the reader to his U.S. Appl. No. 07/740,004 filed August 2, 1991 (now US Pat. No. 5,280,491) entitled "Two Dimensional Scan Amplifier Laser", which also discloses a fundamentally **infrared** laser. (See Lai PCT Publication, page 13, lines 13-18; page 16, lines 16-20; and page 17, lines 25-29) Lai indicates that this patent describes the laser used in his preferred embodiment. (Lai, PCT Publication, page 33, lines 13-17).

The preferred laser wavelength for Lai's "initial" laser beam is clearly **infrared** at 790-860 nm (Lai, PCT Publication, page 34, lines 10-11). This initial beam is converted in a first wavelength converter 108 by nonlinear mixing to a second laser beam having a wavelength in the range of 395-430 nm, and passed through a second wavelength converter to a third laser beam having a wavelength in the range of 198-215 nm. (Lai, PCT Publication, page 34, lines 11-23) Lai states that his system includes at least one wavelength converter to alter the wavelength of the initial laser beam to the desired

wavelength in the range of 198-215 nm. (Lai, PCT Publication, page 56, lines 15-18, et seq.) Lai's laser has a "fundamental laser wavelength" in a range of 790-860nm (Lai, PCT Publication, page 57, lines 5-10)

Moreover, Lai declares that it is an object of his invention to construct an (infrared) Ti:Al2O3 laser with a high average laser power "in the range of several watts or higher" and a high conversion efficiency in the second harmonic laser wavelength (Lai PCT Publication, page 18, lines 27-30; page 19, lines 5-8).

Lai fails to disclose, teach or suggest a fundamentally **ultraviolet** laser, as recited by <u>all</u> Reissue claims of the present invention.

<u>Ablation threshold</u>

Claims 1-24, 26-30, 32, 35-41, 43-49, 53-55, 57-60, 63-68, 76, 78-85, 87-98, 105-106 recite an energy level of <u>no greater than **10** mJ/pulse</u>.

The Lai U.S. Appl. considers an <u>ablation</u> threshold of **10** mJ/cm2, but indicates that using his invention a laser having a fundamental laser output of <u>**at least 150** mJ/cm2 is required</u>. See, e.g., Lai's teaching that "[f]or reliable ablation results, a current commercial excimer laser corneal surgery system operates at about **150-200** mJ/cm2." (Lai PCT Publication, page 7, lines 1-2) See also, e.g., Lai's PCT Publication at page 30 where Lai teaches that an even higher output energy range (**150-250** mJ/cm2) is required for cornea ablation, and that "no ablative action can be observed at a laser energy density below 50 mJ/cm2." (Lai, PCT Publication, page 30, lines 24-29)

Thus, the Lai application teaches the use of an initial high energy laser beam of at least **150** mJ/cm2, and "regulates" that initial laser beam through wavelength converter(s) by attenuating a harmonic frequency of the laser pulses to ultimately achieve an <u>ablation</u> energy density of 10 mJ/cm2 on the eye. (Lai PCT Publication, page 33, lines 4-6)

The Lai application fails to disclose, teach or suggest an energy level of no

greater than **10** mJ/pulse as recited by claims 1-24, 26-30, 32, 35-41, 43-49, 53-55, 57-60, 63-68, 76, 78-85, 87-98, 105-106.

Selection of a scanning mechanism including a ***galvanometer scanning mechanism***

Patented claims 1-23 recite the selection of a scanning mechanism including a galvanometer scanning mechanism.

The Lai application teaches *away from* the use of a galvanometer scanning mechanism. For instance, the Lai application admonishes the use of galvanometer mirror scanners because "the mechanical response due to the balance of the coil and the applied magnetic field is limited to a few hundred hertz" and because the "settling time and oscillation about the equilibrium point further limits the accuracy attainable with such devices." (See Lai PCT Publication, page 9, lines 19-23) The Lai application further teaches away from the use of a galvanometer scanning mechanism by pointing out that because two galvanometer units must be used to provide two-dimensional scanning, costs and space requirements are doubled. (See Lai PCT Publication, page 10, lines 9-13).

Rather than galvanometers having all the alleged problems discussed by Lai, Lai declares that his preferred embodiment consists of a pair of scanning mirrors driven in tandem by piezo actuators. (Lai PCT Publication, page 19, lines 18-20) Lai accomplishes this piezo-driven scanning within the laser cavity. According to Lai, the "laser beam bounces between the scanning mirrors repeatedly for one or more round trips of the beam inside the cavity to amplify and precisely direct the beam angle before exiting mirror 34." (Lai PCT Publication, page 77, lines 9-12)

According to the present invention, scanning is accomplished with, e.g., galvanometers positioned outside the laser cavity, in the beam delivery path after the laser beam has left the laser cavity.

Lai's piezo-driven scanning mirrors are not galvanometers as claimed by claims 1-23. Accordingly, patented claims 1-23 are patentable over the prior art of record.

Conclusion

For at least all the above reasons, all pending claims of the present application are distinguishable from the disclosure and teachings of the Lai U.S. Application as represented by the published corresponding PCT application.

The Applicants respectfully request a formal indication that the Examiner has considered the Lai U.S. patent application on its merits.

All rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect of this Reissue is earnestly solicited.

Respectfully submitted,

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